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Hallucination Research: Into the Future, and Beyond

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Hallucination research is undergoing major changes. The sharing of knowledge, techniques, data, and resources together with the cross-pollination of ideas and inspiration hold promises of new breakthroughs and clinical discoveries for people who are experiencing distressing voices, visions, and related symptoms.

The articles in this special supplement of *Schizophrenia Bulletin* comprise the reports of 7 working groups who presented at the recent meeting of the International Consortium on Hallucination Research and Related Symptoms (ICHR). ICHR is a multidisciplinary initiative that brings together a balance of researchers, clinicians, voice-hearers, and decision makers to enhance our understanding of hallucinations in its various manifestations. In the past 7 years, and building on knowledge gained from each meeting,^{1–3} collaborative activities among ICHR attendees have made a practical difference in the development of translational research, fostering of dynamic and productive relationships, progress toward genuine engagement with voice hearers and consumer organizations, and building of capacity through student exchange and multicenter initiatives.

On November 6–8, 2017, the fourth biannual meeting of the ICHR took place in Lille, France, hosted by R.J. and F.L. It was attended by 225 participants from 18 countries. Through guided activities, working-group presentations, and group discussions (see full program at ichr2017.sciencesconf.org), a range of issues, challenges, and difficulties were discussed. Voices, visions, and related symptoms are extremely difficult to understand, and there was a consensus for the continued importance of mixed approaches and multiple perspectives to secure the best possible outcomes.

In the preparation for the Lille meeting and this supplement, we were guided by the recommendations from previous meetings, emerging topics, and new proposals. There were 19 oral presentations and 33 posters. Major themes were as follows:

- Interventions and self-help groups (with a “living sculptures” workshop from Ron Coleman and Karen Taylor and a prize-winning poster from Mark Hayward on the Sussex Voices Clinic, United Kingdom);
- Neurodevelopmental and maturational perspectives (with presentations from Agna Bartels, Kim Majer, and Iris Sommer, the Netherlands);
- Trauma (Tanya Luhrmann, United States; F.W., Australia; Craig Steel, United Kingdom; Simon McCarthy-Jones, Ireland);
- Digital technologies in hallucination assessment, treatment, and self-help (Neil Thomas, Australia; R.J., France; Josef Bless, Norway; David van den Berg, the Netherlands);
- Neurobiological processes (Andrei Arkhipov and Maslennikova, Russia; Judith Ford, United States; Susan Rossell and Matthew Hughes, Australia; Todd Woodward, Canada; and a “Best Poster prize” awarded to Natasza Orlov and Paul Allen, United Kingdom, for their work on real-time fMRI neurofeedback to down-regulate superior temporal gyrus activity);
- The continuum of experiences in the community and in different cultures (Philip Corlett, United States; Peter Moseley and Charles Fernyhough, United Kingdom; Sara Siddi and Antonio Preti, Italy);
- The relationship between hallucinations and other symptoms (Clara Humpston and David Linden, United Kingdom; Elizabeth Pienkos, Cherise Rosen

and Nev Jones, United States; Angela Woods, United Kingdom); and

- Subtypes of hallucination experiences (Craig Steel, United Kingdom; Daniel Collerton, United Kingdom; Prabitha Urwyler, Switzerland; Susan Rossell, Australia; Maya Schutte and Iris Sommer, the Netherlands).

The reports from 7 groups are presented here. Other presentations discussed collaborative projects in progress and new ideas for consideration in future meetings.

In the first article, Majer et al⁴ present a summary of the issues that have dominated the field on hallucinatory experiences in children and adolescents since the last 2014 ICHR review on the topic.⁵ Notably, the study warns us to be careful about an overreliance on the significance of terminology such as “persistence” given the varied trajectories of symptoms across psychotic, affective, anxiety, autistic and personality disorders, and the behavioral and functioning spectrum. Accumulating evidence strongly links hallucinations in children and adolescent with suicidality and flags the importance of social and cultural factors in modulating the initial appearance and appraisal of hallucinations. A review of therapeutic approaches for children and adolescent seeking help for hallucinations provides valuable insights into the role and evidence base of psychoeducation, psychotherapy, community services, and medications. Finally, some recommendations about assessment measures and clinical and treatment approaches provide a useful framework (and a “stepwise guide” for clinicians) when encountering children and adolescents in clinical practice.

Luhrmann et al⁶ then explore the possibility of multiple pathways to hallucinations. Trauma has featured most prominently in psychosis research in the past few years and it is a topic of enormous clinical importance. Although the negative impact of trauma can never be disputed or ruled out, the authors incline us toward caution in inferring an inherent link between trauma and hallucinations. They suggest that trauma sometimes plays a major role in hallucinations, sometimes a minor role, and sometimes no role at all. Using novel ethnography evidence collected in Ghana’s “okomjo,” as well as qualitative and quantitative information, they describe patterns of hallucinatory experiences that appear to vary as a function of trauma input. Evidence presented in support includes the role of imagery practice, focused attention, wilful training, and/or compartmentalization, which act to form and shape hallucination-like experiences.

In the third article, Thomas et al⁷ discuss the application of digital technologies such as computer software, the Internet, smartphones, wearable sensors, computer games, or virtual reality to the needs of people with hallucinatory experiences. They argue that the field of digital mental health is rapidly expanding with digital

tools being used for the purpose of mental-health assessment, intervention, and supporting self-help, but that the application of this digital technology to hallucinations is lagging. It is envisaged that digital tools will contribute to improved self-management and service provision for people experiencing hallucinations. Highlighted uses include smartphones to monitor and manage intermittently occurring hallucinations, therapeutic applications of audio and video media such as virtual and augmented reality, specific exercises targeting verbal aspects of hallucinations, and avatars to represent hallucinatory voices and to facilitate peer support. Challenges in the further development of digital tools include how to increase access, how to market resources to people who need it, identifying suitable funding schemes, and how to navigate the opportunities and challenges brought about by big datasets.

Next, Siddi et al⁸ report on a large multicountry study that sought to address similarities and differences in hallucinatory-like experiences across cultures, stability of the continuum construct, invariance, and psychopathological correlates (the E-CLECTIC study). The study enrolled 4419 participants across 10 countries to establish the validity, factor structure, and measurement invariance of the Launay–Slade Hallucinations Scale–Extended (LSHS-E). Network analyses between the LSHS-E and the 3 dimensions of the Community Assessment of Psychic Experiences (CAPE) were performed to assess convergent and divergent validity of the LSHS-E. Based on confirmatory factor analysis, the best fit was a 4-factor model, which proved invariant by country and clinical status, pointing to cross-national stability of the hallucination-proneness construct. Among the different components of hallucination-proneness, auditory-visual hallucinatory experiences had the strongest association with the positive dimension of the CAPE (compared with the depression and negative dimensions). Finally, the LSHS-E’s intrusive and unwanted thoughts dimension was more prominently represented among people with a diagnosis of mental illness than in nonclinical individuals pointing to subtle differences between clinical and non-clinical groups in symptom expression.

In a departure from previous years in which much work was devoted to characterizing hallucinations only, the next 2 reports attempt to characterize their relationship to other symptoms. First, Humpston et al⁹ explore how computational psychiatry approaches can explain auditory verbal hallucinations and delusions. Instead of viewing phenomenology and neuroscientific approaches as opposed and essentially incompatible, the authors argue that these fields may be bridged through the use of modeling. Through a blending of computational mathematical models and phenomenological accounts, they explain how delusional thoughts and hallucinations can be viewed as intrinsically related. Although modern approaches have tended to view hallucinations and

delusions as separate and dichotomous phenomena, the authors argue that they are both epiphenomena of a transformation in consciousness, different manifestations of similar neural processes, and that this framework can be explained through computational models. Through this theoretical lens, experiences such as auditory verbal hallucinations, agency deficits, and delusions of ownership of thoughts may also be explained.

Pienkos et al¹⁰ then explore the relationship between hallucinated voices and other phenomena including expressions of subjectivity with a view to expand our understanding of the phenomenological constellation to which hallucinations belong. They argue that the move away from traditional diagnostic categories toward a transdiagnostic approach has tended to isolate symptoms (like hallucinations) from related experiential states and obscure the complex and dynamic changes occurring simultaneously in other domains of experience. Their report contextualizes hallucinations within the realm of mental states associated with psychosis, with a focus on perception, selfhood and reality, temporality, interpersonal experience, and embodiment. The authors then discuss phenomenological and neurocognitive theories on “pre-reflective” processes involved in these changes, as well as the potential impact of trauma on these phenomena. They suggested that future research should incorporate a broader range of experiential alterations, potentially expanding on traditional definitions of hallucinations.

The final report addresses some of the limitations in the assessment of symptoms in clinical population groups. Although clinical interventions that target multiple modalities of hallucinatory experiences are still in early stages of development, evidence is accumulating of the importance of assessing these experiences in a methodologically valid way. Rossell et al¹¹ present validation data for the Questionnaire for Psychotic experiences (QPE) that assess hallucinations in multiple modalities. After receiving input from voice-hearers and ICHR members during scale development, the 50-item QPE was designed to assess the presence, severity, and phenomenology of hallucinations and delusions. Validation was conducted in 173 participants who fulfilled diagnostic criteria for schizophrenia, schizoaffective disorder, bipolar affective disorder, major depressive disorder, and non-clinical participants with psychotic experiences. Analyses showed good psychometric properties, consolidating an argument for the QPE to be used in transdiagnostic assessments.

Overall, these reports present several key and priority areas for hallucination research over the coming years. These also represent many challenges and opportunities that cannot be achieved without strong collaborative relationships between experts with different areas of expertise, as well as genuine partnerships with people with

lived experience who must be consulted about research which concerns them. The following open scientific meeting of the ICHR has just been held in Kyoto, Japan (October 2018), hosted by Dr Jun Miyata and Dr Michihoko Koeda, whereas the upcoming biennial ICHR meeting will take place in Durham, United Kingdom, in September 2019, hosted by Pr. Charles Fernyhough. Further details about the ICHR and future meetings are available from hallucinationconsortium.org.

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